

## Claims

We claim:

1. A method for reducing unwanted noise in a communication signal, comprising:
  - (A) receiving a digital input stream;
  - (B) pre-emphasizing said received digital input stream producing pre-emphasized data;
  - (C) storing said pre-emphasized data in a buffer;
  - (D) concatenating said buffer containing said pre-emphasized data to produce a frame of data;
  - (E) windowing said frame of data to provide data with a minimum of spectral leakage;
  - (F) transforming said windowed data into the frequency domain;
  - (G) calculating a power estimate for said frequency domain transformed data;
  - (H) temporally smoothing said power estimate to produce time smoothed data;
  - (I) transversally smoothing said time smoothed data to produce smoothed power data;
  - (J) weighting frequency values based on said smoothed power data to provide weighted FFT data;
  - (K) inverse transforming said weighted FFT data to provide a time domain waveform;
  - (L) inverse windowing said time domain waveform to provide a de-windowed time domain sample;

*normalized  
Power*

*was spectrum?*

- 1 (M) de-emphasizing said de-windowed time domain sample to remove  
2 frequency emphasis effects from said time domain sample; and  
3 (N) generating a digital output stream of said de-emphasized data.
- 4 2. A method for reducing unwanted noise in a communication signal, as recited in  
5 claim 1, wherein said received digital input stream originates from a cellular telephone  
6 having a digital voice output.
- 7 3. A method for reducing unwanted noise in a communication signal, as recited in  
8 claim 1, wherein said pre-emphasizing flattens the spectral energy of said received digital  
9 input stream.
- 10 4. A method for reducing unwanted noise in a communication signal, as recited in  
11 claim 1, wherein said concatenating said buffer, further comprises combining a previous  
12 input buffer with said buffer to provide a frame overlap of approximately 50%.
- 13 5. A method for reducing unwanted noise in a communication signal, as recited in  
14 claim 1, wherein said windowing employs a Hanning Window function.
- 15 6. A method for reducing unwanted noise in a communication signal, as recited in  
16 claim 1, wherein said windowing employs a Rectangular Window function.
- 17 7. A method for reducing unwanted noise in a communication signal, as recited in  
18 claim 1, wherein said transforming further comprises using a Fast Fourier Transform to  
19 create one or more resulting frequency domain data frequency bins.
- 20 8. A method for reducing unwanted noise in a communication signal, as recited in  
21 claim 1, wherein said calculation of power estimate further comprises summing the  
22 squares of the real components of each frequency bin to the squares of the imaginary  
23 components of each frequency bin.

1 9. A method for reducing unwanted noise in a communication signal, as recited in  
2 claim 1, wherein said temporally smoothing further comprises averaging said power  
3 estimate.

4 10. A method for reducing unwanted noise in a communication signal, as recited in  
5 claim 1, wherein said temporally smoothing further comprises low pass filtering said  
6 power estimate.

7 11. A method for reducing unwanted noise in a communication signal, as recited in  
8 claim 1, wherein said transversely smoothing further comprises averaging said time  
9 smoothed data.

10 12. A method for reducing unwanted noise in a communication signal, as recited in  
11 claim 1, wherein said transversely smoothing further comprises low pass filtering said  
12 time smoothed data.

13 13. A method for reducing unwanted noise in a communication signal, as recited in  
14 claim 1, wherein said weighting frequency values further comprises:

15 (1) generating an array of weighting scalars; and

16 (2) multiplying said array of weighting scalars by said frequency  
17 domain transformed data.

18 14. A method for reducing unwanted noise in a communication signal, as recited in  
19 claim 1, wherein said inverse transforming uses an Inverse Fast Fourier Transform.

20 15. A system for reducing unwanted noise in a communication signal, comprising:

21 (A) a telephone;

22 (B) a noise reducing telephone adapter in electronic communication with said  
23 telephone;

1 (C) a speaker in electronic communication with said noise reducing telephone  
2 adapter; and

3 (D) a microphone in electronic communication with said noise reducing  
4 telephone adapter.

5 16. A system for reducing unwanted noise in a communication signal, as recited in  
6 claim 15, wherein said noise reducing telephone adapter, further comprises:

7 (1) a processor;

8 (2) an analogue to digital converter electrically connected to said  
9 processor;

10 (3) a digital to analogue converter electrically connected to said  
11 processor; and

12 (4) a memory unit electrically connected to said processor.  
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